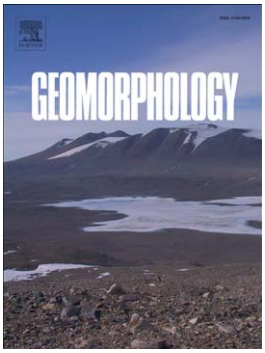

River gradient anomalies reveal recent tectonic movements when assuming an exponential gradient decrease along a river course

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PII: S0169-555X(16)31224-7
DOI: doi:10.1016/j.geomorph.2016.12.017
Reference: GEOMOR 5863

To appear in: *Geomorphology*

Received date: 8 March 2016
Revised date: 14 December 2016
Accepted date: 18 December 2016

Please cite this article as: Žibret, Gorazd, Žibret, Lea, River gradient anomalies reveal recent tectonic movements when assuming an exponential gradient decrease along a river course, *Geomorphology* (2016), doi:10.1016/j.geomorph.2016.12.017

River gradient anomalies reveal recent tectonic movements when assuming an exponential gradient decrease along a river course

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Abstract

High resolution digital models, combined with GIS or other terrain modelling software, allows many new possibilities in geoscience. In this paper we develop, describe and test a novel method, the GLA method, to detect active tectonic uplift or subsidence along river courses. It is a modification of Hack`s SL-index method in order to overcome the disadvantages of the latter. The core assumption of the GLA method is that over geological time river profiles quickly adjust to follow an exponential decrease in elevation along the river course. Any large deviation can be attributed to active tectonic movement, or to disturbances in erosion/sedimentation processes caused by an anthropogenic structure (e.g. artificial dam). During the testing phase, the locations of identified deviations were compared to the locations of faults, identified on the 1:100,000 geological map. Results show that higher magnitude deviations are found within a maximum radius of 200 m from the fault, and the majority of detected deviations within a maximum radius of 600 m from faults or over-thrusts. However, these results are not the best that could be obtained because the geological map that was used (and the only one available for the area) is not of the appropriate scale, and was therefore not precise enough. Comparison of deviation magnitudes against PSInSAR